NISTIR 6890

Fire Resistance Determination and Performance Prediction Research Needs Workshop: Proceedings

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Editor

National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

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September 2002

U.S. Department of Commerce
Donald L. Evans, Secretary

Technology Administration
Phillip J. Bond, Under Secretary of Commerce for Technology

National Institute of Standards and Technology
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APPENDIX III. Presentations

A. NIST Response to Sept. 11
Shyam Sunder, Chief, Structures Division
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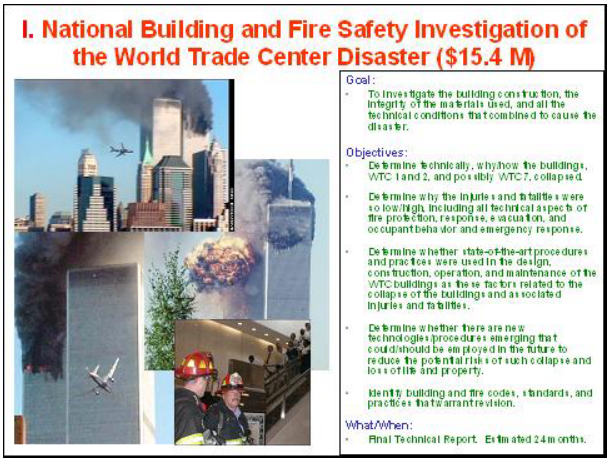
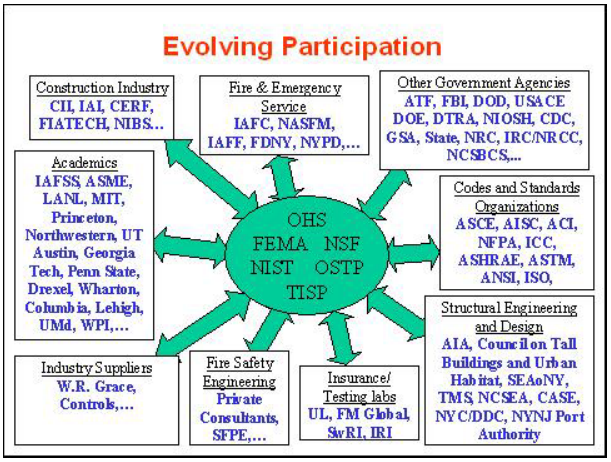
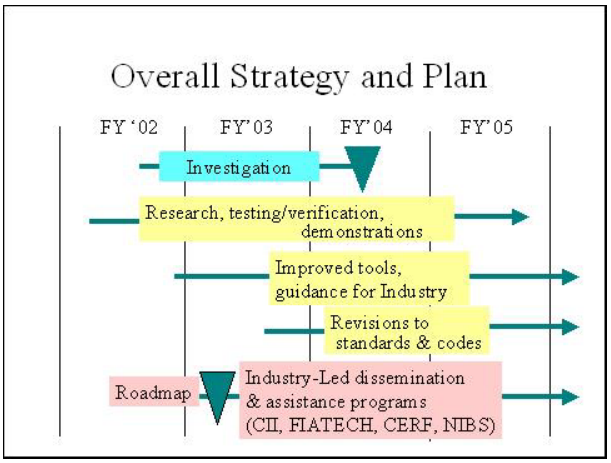






Legislative Authorities

Structural Failures [P.L. 99-73, Sec. 7; 15 U.S.C. 281a]

The National Institute of Standards and Technology, on its own initiative but only after consultation with local authorities, may initiate and conduct investigations to determine the causes of structural failures in structures which are used or occupied by the general public. No part of any report resulting from such investigation shall be submitted as evidence or used in any suit or action for damages arising out of any matter mentioned in the report.

Fire Prevention and Control Act [P.L. 93-498, Sec.16, (a), (3)]

NIST conducts and supports research on all aspects of fire with the aim of providing scientific and technical knowledge applicable to the prevention and control of fires. The Act authorizes NIST to conduct "...operation tests, demonstration projects and fire investigations in support of the activities set forth in this section."

Prior NIST Investigations…

- **Earthquakes**
  - San Fernando, CA (1971)
  - Mexico City, Mexico (1985)
  - Loma Prieta, CA (1989)
  - Northridge, CA (1994)
  - Kobe, Japan (1995)
  - Kocaeli, Turkey (1999)
- **Hurricanes**
  - Camille, MS/LA (1969)
  - Alicia, Galveston, TX (1983)
  - Hugo, SC (1989)
  - Andrew, FL (1992)
  - Hurricane Mitch and Georges, LAC (1998)
- **Construction/Building**
  - Skyline Plaza Apartments, Bailey's Crossroads, VA (1973)
  - Willow Island Cooling Tower, WV (1978)
  - Kansas City Hyatt Regency, Kansas City, MO (1981)
  - Riley Road Interchange, East Chicago, IN (1982)
  - Harbor Cay Condominium, Cocoa Beach, FL (1981)
  - L'Ambiance Plaza, Hartford, CT (1987)
  - Ashland Oil Tank Collapse, Floreffe, PA (1988)
  - U.S. Embassy, Moscow, USSR (1987)
  - Murrah Federal Building, Oklahoma City, OK (1995)
- **Tornadoes**
  - Jarrell, TX (1997)
  - Spencer, SD (1998)
  - Oklahoma City, OK (1999)
- **Fires**
  - DuPont Plaza Hotel, San Juan, PR (1986)
  - First Interstate Bank Building, Los Angeles, CA (1988)
  - Loma Prieta Earthquake, CA (1989)
  - Hillhaven Nursing Home (1989)
  - Puliatki Building, Washington, D.C. (1990)
  - Happyland Social Club, Bronx, NY (1990)
  - Oakland Hills, CA (1991)
  - Hotel de Ville, Japan (1993)
  - Wall St., New York City (1994)
  - Northridge Earthquake, CA (1994)
  - Kobe, Japan (1995)
  - Vandalia St., New York City (1998)
  - Cherry Road, Washington, D.C. (1999)
  - Keokuk, IA (1999)
  - Houston, TX (2000)
  - Phoenix, AZ (2001)

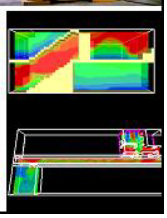
Results:
- Probable technical cause
- Lessons learned: successes and failures
- Improvements to standards, codes, and practices
- Establish future research priorities

Authorities:
- *NIST Act (1986):* structural investigations
- *NEHRP Reauthorization Act (1990):* earthquakes
- *National Post-Storm Data Acquisition Plan:* wind storms and floods
- *Federal Response Plan:* structural and fire safety; disaster operations and situation assessment; urban and industrial hazard analysis
- *Fire Prevention and Control Act (1974):* fire investigations

II. Structural Fire Protection $20.6 M

- Fire safety design & retrofit of structures
- Method of fire resistance determination
- Mitigation of progressive collapse
- Improved fire resistance coatings

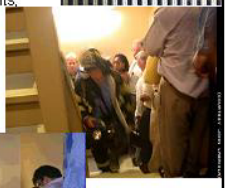
Partners: ASCEC (ADC, ACI, SFPE, NFPA, CASE, Council on Tall Buildings, ICC, GSA/NIH, TMG, NCSEA), FEMA, USACE, DTRA, NRC, NRCC, mat'l ind., NSF, FM Global, ASTM, ISO, CII, ACI, AIA, UL, universities,...

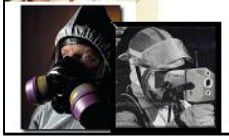


III. Human Behavior, Emergency Response & Mobility $6.6 M

- Fire simulation re-creation tool
- Occupant behavior & response
- Tech. for emergency mobility
- Guidelines, equipment standards for fire & emergency responders

Partners: NFPA, FDNY, NYPD, WTC Occupants, FBI, FEMA, USFA, ATF, NRCC, universities, NSF, SFPE, IAFC,.

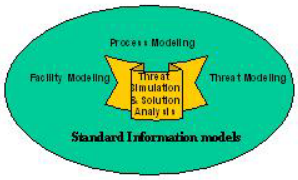




IV. Building Vulnerability Reduction $7.8 M

- Standard information models
- Guidelines, advanced technology for Chem. Bio. Rad. attacks
- Cost-effective risk management tools

Partners: IAI, FIATECH, ASHRAE, GSA, DOD, State Department, GSA, Wharton, NSF, CII, NCSBCS,…

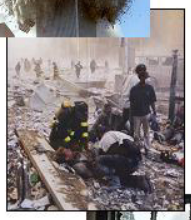


V. National Construction and Infrastructure Roadmap and Support $6.0 M

Concept:
- Principal national forum through which facility owners and contractors deliver and disseminate results of research into ongoing construction projects and practice.
- Draw on top management, chief scientists/technology officers to direct and motivate needed change.
- Complement and support parallel efforts of engineering societies to improve technology, codes, and standards.

Functions:
- Provide advice on best practices, guidance on vulnerability assessment, guidance on standards and codes needs.
- Conduct safety related R&D.
- Disseminate and implement R&D outputs.
- Act as clearinghouse (Q&As, industry inputs, needs/priorities, etc,…)
- Benchmark results

Partners:
- Construction Industry Institute (CII)
- Civil Engineering Research Foundation (CERF)
- National Institute of Building Sciences (NIBS)



Outputs and Impacts

Outputs:
- Authoritative answers
- Practical/best practices guidance in near term
- Applications of cost-effective state-of-the-art and advanced technologies in mid term
- Revisions to standards and codes

Impacts:
- Reduced vulnerability - saved lives & costs
- Speedier economic recovery and renewed growth